PATENT SPECIFICATION

674,118

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COMPLETE SPECIFICATION

Improvements in and relating to Fuelling Systems for Aeroplanes

We, ALBERT EDWARD WATTS, JR., and JACK ROYAL PARKER, both citizens of the United States of America, respectively, of 410, East Shore Road, Great Neck, Long Island, New York, United States of America, and 1837, Coleman Street, Brooklyn, New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a fuelling system for airports or lesser landing fields of the type having submerged fuel storage tanks and distributing piping leading to a number of fuelling and servicing units disposed relative to the landing strips or loading areas, so that the units are in proper position to fuel and service the plane. When not in use, such fuelling and servicing units are contained within a pit casing submerged in the ground, so that with the cover plate closing the pit, no obstruction appears on the ground.

A fuelling system, according to the invention comprises, in combination, submerged fuel storage tanks, submerged pump pits therefor, a plurality of submerged pit casings, cell units, each containing fuelling and servicing equipment, mounted in the respective pit casings for vertical movement from a lowered position within the pit casings to an elevated position outside and above the pit casings, submerged valve pits adjacent respective pit casings, distributing piping from said pump pits associated with the storage tanks to said valve pits of the casing units, and a pipe connection including a length of flexible hose between each said valve pit associated with the submerged pit casings and its respective elevatable cell unit.

The invention is illustrated by way of example by the accompanying drawings, of which

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Fig. 1 is a sectional elevation through an improved dispensing unit (on the line 1—1 of Fig. 2);

Fig. 2 is a cross-sectional view of the unit, taken on the line 2—2 of Fig. 1;

Fig. 3 is another sectional elevation, but taken on the line 3—3 of Fig. 2; and

Fig. 4 is a perspective view of the tank and pumping system and the distribution piping to various dispensing units, and showing one unit in elevated position and fueling the wing tank of an airplane.

The improved system of our invention comprises a plurality of submerged fuel storage tanks 32 (see Fig. 4) each having a submerged pump 29 to pump the fuel through a plurality of distributing pipes 28, each connected to one or more dispensing and servicing units. Only one such unit is shown in Fig. 4 where it is represented by a pit casing 3 which is set into the ground, and the dispensing and servicing unit 1 which is shown in elevated position in Fig. 4, to fuel the wing tank of an airplane 33.

Said tank pump 29 is disposed in accessible position in a submerged pump pit 66 at each storage tank 32, being shown in Fig. 4 in overlying relation thereof. Each storage pump unit is provided with a check valve 71 in its distributing pipe 28. From the main distributing line (28) of a storage unit, e.g. the extreme left one shown in Fig. 4, T-branches are provided for the several dispensing units on that particular line. One such T-branch is shown leading to a submerged valve pit 31 adjacent to the dispensing unit.

The inlet connections to the storage tanks 32 is indicated in Fig. 4, at 69. The vent pipe of these tanks is shown at 68. Additionally, each pump pit 66 has a depth gauge 67 (shown only in connection with the extreme right tank 32).

Referring now to Fig. 1, the submerged pit casing 3 of each dispensing and servicing unit has an annular rim 16

flush with the ground (14), having an annular rabbet or shoulder to accept a circular plate 15, as clearly shown in Fig. 1. The elevatable dispensing and servicing unit, Fig. 1, is generally designated 1 which reference number points to an enclosed cylindrical cell. Cell unit 1 is supported by a plurality of telescopic pistons 2 working in their respective cylinders, the elevation or lowering of unit 1 being controlled by the oil pressure to the piston cylinders (as will be more fully described subsequently).

The submerged valve pit 31 is adjacent the pit casing 3. The aforesaid distributing pipe 28 (from the storage pumps, Fig. 4) is shown in Figs. 1—2 connected through a solenoid operated valve 24 to a short length of pipe 28^x to a flexible hose 26 within the pit casing 1 in underlying relation to cell unit 1, the flexible hose leading into the bottom of the cell unit, as clearly shown in Fig. 1. Within the cell unit flexible hose 26 connects through a check valve 25, strainer 5 and meter 4 to a hose reel 9. The nozzle of the hose of reel 9 is designated 12; when it is lifted off its hook or seat in which it is normally disposed, a wired connection (not shown) to solenoid valve 24 causes the latter to open and permit the flow of fuel until the nozzle is replaced on its hook, this flow being registered on dial 8 connected to meter 4. Hose reel 9 is implemented with a pulley 10 which is belt or otherwise driven from an electric motor 11, for winding up the hose after use.

Valve pit 31 also has a motor control 23, Fig. 1, for a sump pump 27 for draining the bottom of pit casing 3, the discharge therefrom being a small pipe 72 leading back to valve pit 31.

The aforesaid circular plate 15 which in the normal, lowered position of the elevatable unit, Fig. 1, is flush with casing rim 16 and ground 14, is provided with a plurality of holes 13^x wherethrough respective ones of the vertical standards 13 of a guard rail are slidable, as clearly shown in Fig. 1. Vertical standards 13 of the guard rail are secured to the top of the elevatable unit 1, and form a partial circular enclosure by a plurality of arcuate hand rail sections 43^x (shown in section in Fig. 3) which connect to a cap 43 secured at the top of vertical standards 13. Circular plate 15 is provided with recesses for caps 43, so that when the unit is lowered into the ground, caps 43 completely cover holes 13^x in plate 15, thus making the installation completely rainproof. Additionally, the top surface of plate 15 has an arcuate groove for snugly receiving the rail sections 43^x. Hence in the normal, lowered position of the unit, cap 43 will be received in an aforesaid recess and rail sections 43^x in the arcuate groove so that a flush surface will be presented with no projections which might trip persons on the field.

In operation, the attendant stands on the circular plate 15 (within the area defined by the rail sections 43^x, which in the normal, lowered position of the unit, are close to the top surface of plate 15) and, by certain manipulations—soon described—causes the cell unit 1 to rise. As the cell unit rises, the vertical standards 13 project upwardly, through their said openings in plate 15, thus forming a guard enclosure about the attendant. When the cell, in continuing to rise, or rather its top 41 reaches the underside of circular plate 15, the latter—together with the attendant thereon—is likewise raised by the ascending unit. Shock absorbers 22 are provided on top 41 of the unit to ease the abutting of the cell top 41 and the circular plate 15.

In circular plate 15 is a handhole 42 wherethrough the attendant can reach the controls for elevating the unit, the fuel nozzle 12, etc. Just below opening 42 is a control 38 which is connected by flexible wire 40, Fig. 3, to motor 20 which drives oil pump 21 for operating the elevating-and-lowering pistons 2; the oil reservoir is designated 19 and the oil pressure piping 39. Control 38 may be fitted with a deadman's switch, so that when the operator removes his hand from control 38 the cell will remain at whatever elevation it had been brought when the operator's hand is removed.

The other controls are assembled for ready access in a control box 34 on the roof 41 of the unit, easily reached when handhole 42 is opened. Among these is a control 36 for motor 11 for rewinding the fuel hose on reel 9, and a control 37 for resetting the register. These controls enable parts within the cell unit 1 to be operated from outside of the cell. However, the sides of the cell are removable so that, when the inner parts are to be repaired, the unit is elevated to the desired height from the ground, and the particular side or sides removed to gain ready access to the interior of the unit.

The cell unit 1 is continued in its ascent by the attendant standing on its circular plate 15, until it is raised to the proper elevation relative to the wing of the airplane. To facilitate the attendant's movement between circular plate 15 of the elevated unit and the top of the

wing, a platform extension 17 is spanned from the unit to the wing. Normally, the platform extension is contained within cell 1 just below its roof or top 41, Fig. 1.

For the purpose of extending and retracting platform 17, its underside is provided with rack teeth with which mesh a pinion 52 secured on a spindle from a speed reducer driven by a motor 18. The control or switch for platform motor 18 is designated 55 in Fig. 2 and is on the aforesaid control box 34. The motor 18 and the speed reducer are fitted with reversing mechanism so that the platform extension 17 can be extended from, or retracted into, the cell unit 1 at will.

Cell unit 1, Fig. 1 may be provided with CO_2 tanks 6 and hose reel 7. The outside of the cell unit 1 is provided with a flood light 30, and also with a gasoline consumption dial 8. The unit may be provided with other accessories, such as a defuelling system, battery - charging system, air-conditioning blowers and fans for readying planes before take-off.

We are aware of a fuelling system for airplanes comprising a submerged fuel storage tank, a submerged pit casing, a cell unit containing fuelling and servicing equipment mounted in the pit casing for vertical movement from a lowered position within the pit casing to an elevated position outside and above the pit casing, a submerged valve pit adjacent the pit casing, and distributing piping from said pit casing associated with the storage tank to said valve pit. In that case, the fuel flows from the valve unit to the cell unit through a nozzle mounted on the valve unit so that it can be swung from an operative position, in which it overhangs the cell unit, to a position outside the path of the cell unit.

We would have it understood that we do not claim anything herein which is claimed in the Specification of our Application for Letters Patent No. 26395 of 1949 (Serial No. 673,998).

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a fuelling system for airplanes, in combination, submerged fuel storage tanks, submerged pump pits therefor, a plurality of submerged pit casings, cell units, each containing fuelling and servicing equipment, mounted in the respective pit casings for vertical movement from a lowered position within the pit casings to an elevated position outside and above the pit casings, submerged valve pits adjacent respective pit casings, distributing piping from said pump pits associated with the storage tanks to said valve pits of the casing units, and a pipe connection including a length of flexible hose between each said valve pit associated with the submerged pit casings and its respective elevatable cell unit.

2. The combination according to claim 1, wherein said flexible hose is connected to a hose reel within said cell unit, a hose wound on said hose reel having a delivery nozzle with fuel discharge control.

3. The combination according to claim 2, further provided with a motor-operated mechanism for rewinding said hose reel.

Dated this 14th day of October, 1949.

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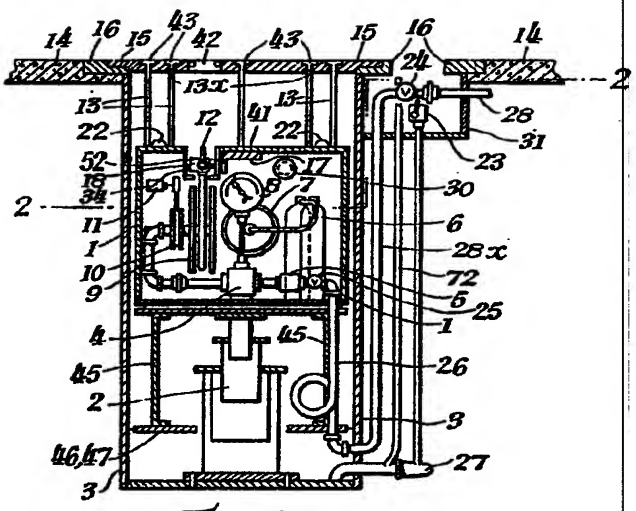

Fig.1.

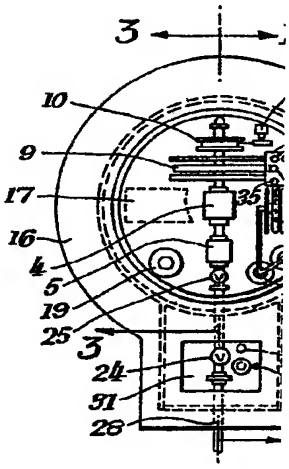

Fig.2.

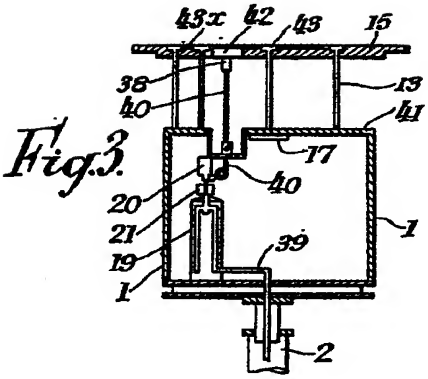

Fig.3.

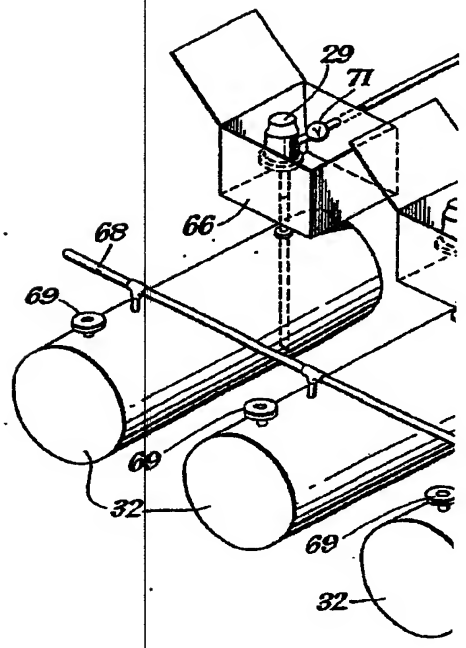

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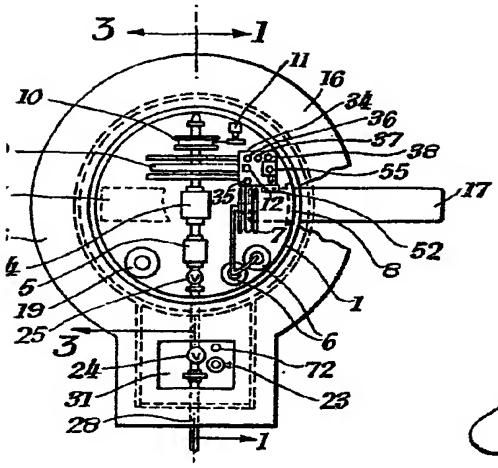
Fig.2.



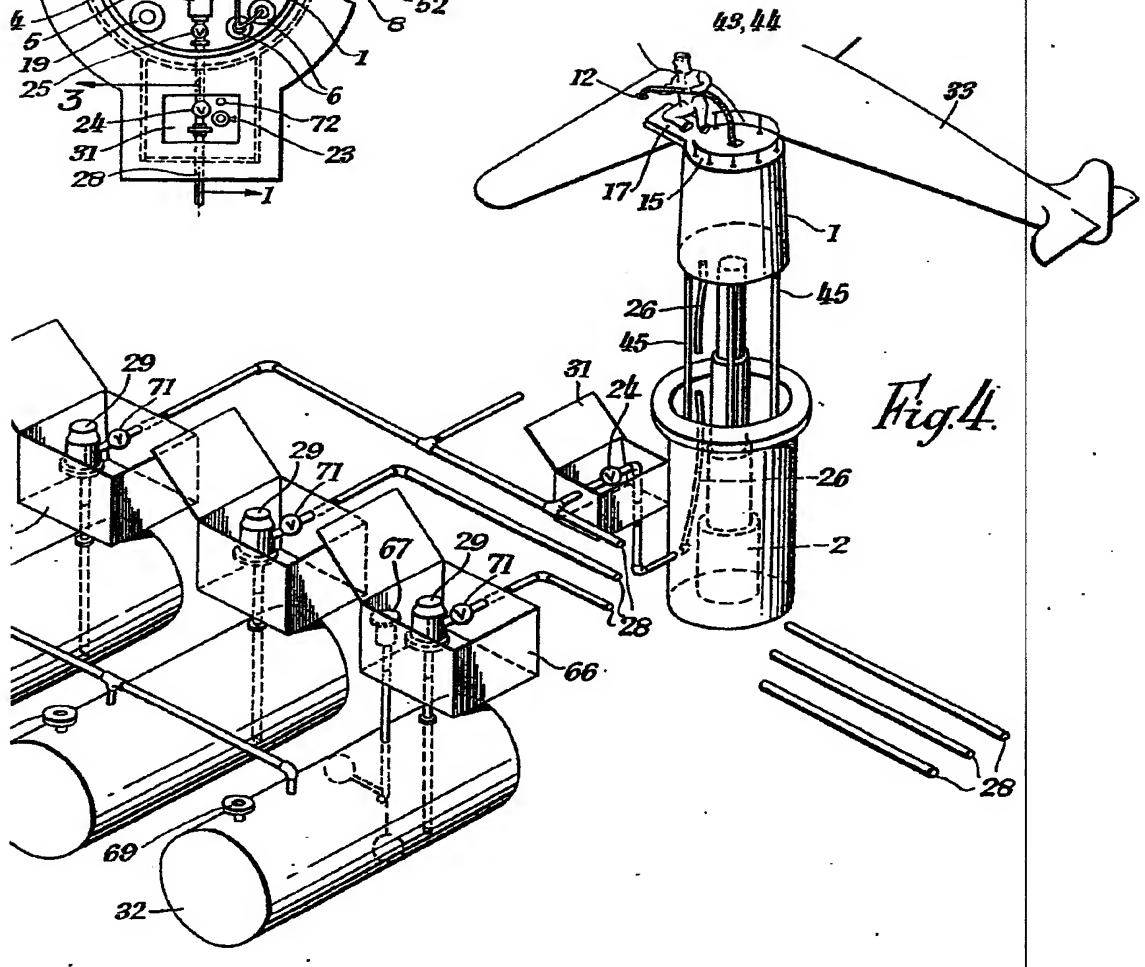


Fig.4.

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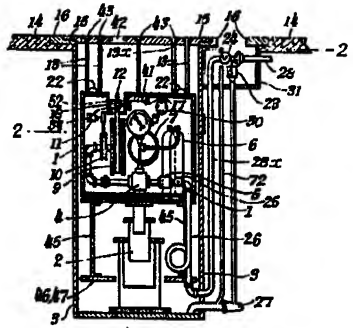

Fig.1.

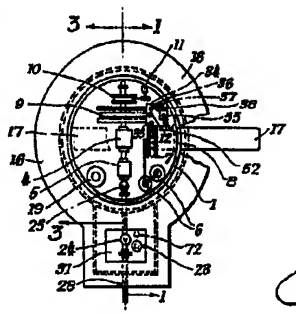

Fig.2.

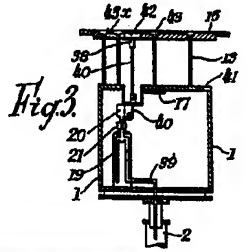

Fig.3.

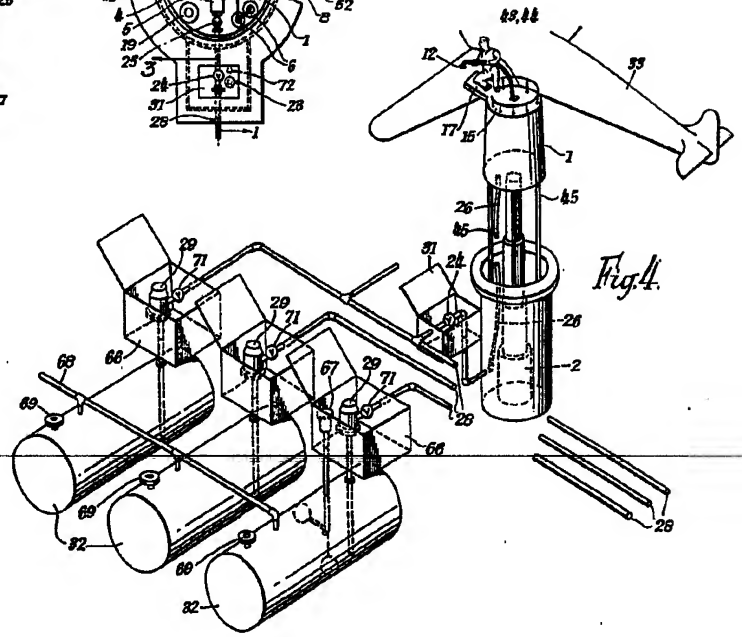

Fig.4.